

CLAIMS

1. A method for producing a composite product comprising a plastic body and a covering layer formed from a metal blank which at least over part of its surface is stuck to the plastic body, wherein
 - 5 - the metal blank (5) is placed in a die, which die comprises a blank holder (24), a mandrel (22) which can move with respect to the blank holder, and a support die (21),
 - the die is closed, so that the support die (21) and the mandrel (22) are located on either side of the metal blank (5), and the metal blank (5) is supported in the vicinity of its edge with the aid of the blank holder (24),
 - 10 - a liquid plastic (10) is injected into the die, the liquid plastic (10) being brought into contact with the preformed metal blank,
 - the liquid plastic (10) being converted into a solid plastic body which is stuck to the preformed metal blank in order to produce the composite product,
 - 15 - the composite product is removed from the die.
2. The method as claimed in claim 1, in which the metal blank is supported in the blank holder in the vicinity of its edge, and in which the metal blank, after the die has been closed and before the liquid plastic is injected, is mechanically preformed with the aid of the mandrel, the mandrel being moved in relative motion along the blank holder toward the support die.
- 25 3. The method as claimed in claim 1 or 2, in which the liquid plastic is injected into the die under pressure, the entire available space being filled with the liquid plastic.
4. The method as claimed in claim 1, 2 or 3, in which the liquid plastic is injected into the die under pressure, during which process the metal blank is shaped.
- 30 5. The method as claimed in one of the preceding claims, in which the pressure is at least 200 bar and at most 4000 bar, preferably at least 400 bar, more preferably at least 800 bar and even more preferably at least 1200 bar.
- 35 6. The method as claimed in one of the preceding claims, in which the liquid plastic is injected into the die at a liquid plastic flow rate of at least 10 cm³/s, preferably of at least 20 cm³/s.

7. The method as claimed in one of the preceding claims, in which during the preforming of the metal blank, the metal blank is clamped between the mandrel and the support die, and the support die is moved together with the mandrel.
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8. The method as claimed in one of the preceding claims, in which the mandrel and the support die are moved apart before or during the injection of the liquid plastic.
- 10 9. The method as claimed in one of the preceding claims, in which during the injection of the liquid plastic the latter is also brought into contact with an end edge of the preformed metal blank.
- 15 10. The method as claimed in one of the preceding claims, in which the metal blank, at least during preforming, is held in the grip, which is closed by spring force, of a holding-down clamp which is present in the blank holder.
- 20 11. The method as claimed in claims 4 and 10, wherein the metal blank, at least during the injection of the liquid plastic, is held in the grip, which is closed by spring force, of the holding-down clamp.
12. The method as claimed in claim 10 or 11, wherein the spring force is selected to be such that the metal blank is pulled out of the grip of the holding-down clamp and in the process is subject to a certain resistance.
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13. The method as claimed in one of the preceding claims, in which, after the liquid plastic has been injected into the die, additional material is injected into the die in at least one after-molding step.
- 30 14. The method as claimed in one of the preceding claims, in which the metal blank is selected from a group of types of metal consisting of steel, stainless steel, galvanized steel, tin-plated steel, chrome-plated steel, copper-plated steel, Ni-coated steel, aluminum, alloys based on aluminum, copper, zinc, nickel, brass, bronze, silver, gold, titanium.
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15. The method as claimed in one of the preceding claims, in which the plastic is selected from a group of types of plastic consisting of PP, PET, PE, ABS, PMMA, SAN, PC, PA, PU, PUR, SAN and copolymers thereof, if desired filled

with a pulverulent filler, such as ceramic and/or metallic particles, or filled with foaming agents.

16. The method as claimed in one of the preceding claims, in which the metal blank
5 is provided with a plastic coating layer which can preferably be fused to the
injected plastic, such as PET, PP or holographic material.

17. The method as claimed in one of the preceding claims, in which the metal blank
10 is cut under the influence of the pressure with which the liquid plastic is forced
into the die.

18. The method as claimed in one of the preceding claims, in which the metal blank,
before it is placed into the die, is provided with means, such as a layer of wax, to
ensure that the plastic body can only stick to the blank over part of the blank.

15 19. A device for producing a composite product which comprises a plastic body and
a covering layer formed from a metal blank, which covering layer, at least over
part of its surface, is stuck to the plastic body, which device comprises a die,
20 which die is provided with a blank holder (24) for the metal blank (5) to be
placed and supported in close to its edge, means for closing the die, a support die
and a mandrel (22) which can move in relative terms along the blank holder
toward the support die, and means for injecting a liquid plastic (10) into the die,
in such a manner that the liquid plastic comes into contact with the metal blank.

25 20. The device as claimed in claim 19, characterized in that the device comprises
means for melting the plastic before injecting the plastic in liquid form into the
die, and means for solidifying the liquid plastic in contact with the metal blank.

30 21. The device as claimed in claim 19 or 20, characterized in that the support die can
move with the mandrel, and the metal blank can be clamped between the support
die and the mandrel.

35 22. The device as claimed in one of claims 19 to 21, characterized in that the support
die and the mandrel, during operating of the means for injecting the plastic into
the die, can be moved away from one another.

23. The device as claimed in one of claims 19 to 22, characterized in that the support die is provided with an uneven support-die surface in order to interact with the composite product to produce a defined shape on the composite product.

5 24. The device as claimed in one of claims 19 to 23, characterized in that the blank holder comprises a holding-down clamp which has a grip which can be closed by spring force in order to hold the metal blank.

10 25. The device as claimed in one of claims 19 to 24, characterized in that the mandrel is provided with an uneven mandrel surface in order to interact with the composite product to produce a defined shape on the composite product.

15 26. The device as claimed in one of claims 19 to 25 for carrying out the method as claimed in claim 17, characterized in that the support die is provided with a recessed section with a cutting edge.

20 27. A composite product produced with the aid of the method as claimed in one of claims 1 to 18, and/or the device as claimed in one of claims 19 to 26, characterized in that the blank has a thickness of between 0.01 mm and 3.0 mm, preferably between 0.03 mm and 1.0 mm, more preferably between 0.05 mm and 0.5 mm.

25 28. A composite product produced with the aid of the method as claimed in claim 18, characterized in that the plastic body is only stuck to the metal blank over part of the blank, in order to form an element which can move with respect to the blank, such as a securing element, a resilient element, a click-fit element, a closure element or a pivoting element.

30 29. A composite product produced with the aid of the method as claimed in claim 17, characterized in that a section of the metal blank is cut out and is connected to the remainder of the blank by means of a thickened plastic portion.

35 30. The composite product as claimed in claim 27, 28 or 29, characterized in that the product is a component for a consumer packaging product, such as a cover, cap or closure, an (electronics) housing, a bodywork component, an interior component for the automotive industry, a catering product, or a computer accessory.